Pressure Analysis

FluiDyne Engineering Corporation, Minneapolis, Minnesota is one of the world's leading companies in design and construction of wind tunnels. The company designed NASA's National Transonic Facility at Langley Research Center and a number of other NASA facilities; it has also designed and built wind tunnels for other U.S. agencies, for foreign governments and for a number of commercial operators.

In its design work, FluiDyne uses a computer program called GTRAN, which was supplied to the engineering firm by NASA's Computer Software Management and Information Center (COSMIC).

In the photo below, FluiDyne senior engineer Dr. Dean Long and a co-worker discuss use of GTRAN in an industrial wind tunnel being designed. With GTRAN, engineers create a design and test its performance on the computer before actually building a model; should the design fail to meet criteria, the system or any component part can be redesigned and retested on the computer, saving a great deal of time and money. At lower right is a FluiDyne-designed wind tunnel at a research facility in Komatsu, Japan.

Transonic wind tunnels consist of a main chamber surrounded by a larger volume, known as the plenum, which is designed to accept the surplus airflow associated with pressure changes in the main flow. As the system rushes to reestablish equilibrium, the wall of the plenum must be able to withstand the pressure, hence must be monitored.

The GTRAN program was originally developed to solve transient problems in flow piping systems. Valves and pipes that connect volumes must be able to withstand pressure changes associated with fluid flow toward equilibrium; GTRAN plots pressure and density changes in such connecting elements. Thus the program was readily adaptable to FluiDyne's need for a means of monitoring the pressure changes in wind tunnels and air supply systems.

Located at the University of Georgia, COSMIC routinely supplies to government and industry customers software packages that can be adapted to uses other than those for which they were originally developed by NASA and other technology generating agencies of the government.